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INVESTMENT IN ON-FARM GRAIN STORAGE FACILITIES: IS IT PROFITABLE FOR A FARMER WHO DOES NOT HEDGE?

by

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During the 1970s on-farm storage expanded dramatically. Farmers obviously felt such an investment to be worthwhile. However, in the 1980s is it economically prudent to build new or replace existing storage facilities?

Since most farmers store grain without hedging or without forward contracting, one aspect of the decision to build storage facilities is whether the price of grain will, on average, increase enough to offset the cost of storage. Cost equals the sum of physical storage cost (cost necessary to keep grain in sellable condition, including depreciation on the physical storage facility), opportunity cost of not selling at harvest (interest), and insurance. Difference between the change in price of the grain and cost of storage equals profit or loss from storage.

Description of Analysis

Price inflation (deflation) will increase (decrease) the returns to storage. Therefore, unless inflation or deflation is expected to continue, returns to storage should be analyzed over a period in which beginning and ending prices are approximately equivalent. For Ohio, recent periods meeting this requirement are crop years 1974-1982 for corn and soybeans and 1975-82 for wheat.

Prices used in the analysis were Ohio mid-month prices. Therefore, the analysis was begun with the mid-month price (i.e., date) nearest the average date by which 50 percent of the harvest is completed. The initial mid-month date therefore approximates the period during which the largest amount of

grain is generally harvested. Applying the selection rule, the analysis for corn and soybeans began with the mid-October price while the analysis for wheat began with the mid-July price.

Interest cost was charged at the prime interest rate, which ranged from 6.8 to 20.4 percent over the period analyzed. Other storage costs, including insurance, were calculated at the rates charged by commercial storers to the Commodity Credit Corporation (CCC) for storing CCC owned grain. These rates ranged from 1.4 to 2.9 cents per month. (Sources for the data are contained in the bibliography.)

Both the CCC storage rates and the prime interest rate probably overstate the cost of on-farm storage for farmers who store over 50,000 bushels on the farm and finance the storage through a CCC nonrecourse loan. These farmers have achieved substantial economies of size in storage and through the CCC loan can generally borrow at an interest rate less than the prime. However, for other farmers the CCC storage rates and the prime interest rate probably accurately reflect the cost of storage associated with new on-farm storage facilities. In addition, deviations from the storage costs used, unless large, have no substantial influence on the results.

The analysis was conducted by first calculating a harvest equivalent price for each month of the crop year. This price was obtained by adding storage costs to the mid-month price for the month the analysis began (corn, October; soybeans, October; and wheat, July). For example, the harvest equivalent price for corn sold in January equalled the October price plus storage costs from mid-October to mid-January. The actual mid-month price was then divided by its storage equivalent harvest price. Percent return (loss) to storage resulted.

Results

Although losses from storage were not large through the ninth month for corn and soybeans and the sixth month for wheat, there was however no sustained period during which price increases equalled or exceeded storage costs (Table 1 and Figure 1). Therefore, on average no substantial returns to storage were evident over the period studied.[1]

There were however years in which storage for part or most of the crop year paid handsomely. Consequently, to gauge the possible as opposed to average returns to storage, it was assumed that all a farmer's crop was sold in the most profitable month during the crop year, be it harvest, mid-year, or just before next year's harvest. This situation, which approximates perfect knowledge, (i.e. 20/20 hindsight) resulted in average annual returns above storage costs of 12 percent for corn, 18 percent for soybeans, and 8 percent for wheat.

Part of the above returns result from marketing skills and part from use of the best mechanical trading rule for storage. Therefore, to gauge returns to marketing skills, a mechanical trading rule for storage was developed after carefully examining the data for such trading rules. The rule developed involved selling the crop at harvest if production plus carry-in stocks was at least ten percent less than the preceding year's supply (takes advantage of short crops' usual long-market tail). Otherwise, the crop was sold the first month with a 25 percent return to storage for corn, a 20 percent return for soybeans, and a 10 percent return for wheat but no later than July for corn, August for beans, and January for wheat. The results: an annual average

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[1]Changing the beginning date of the analysis changes the magnitude of the monthly returns to storage but not the overall conclusion. As a general rule, the later a farmer harvests the crop, the greater the return to storage.

Table 1. Average Percent Profit or Loss from Storing Corn, Soybeans, and Wheat, Ohio, Crop Years 1974-1982.[a]

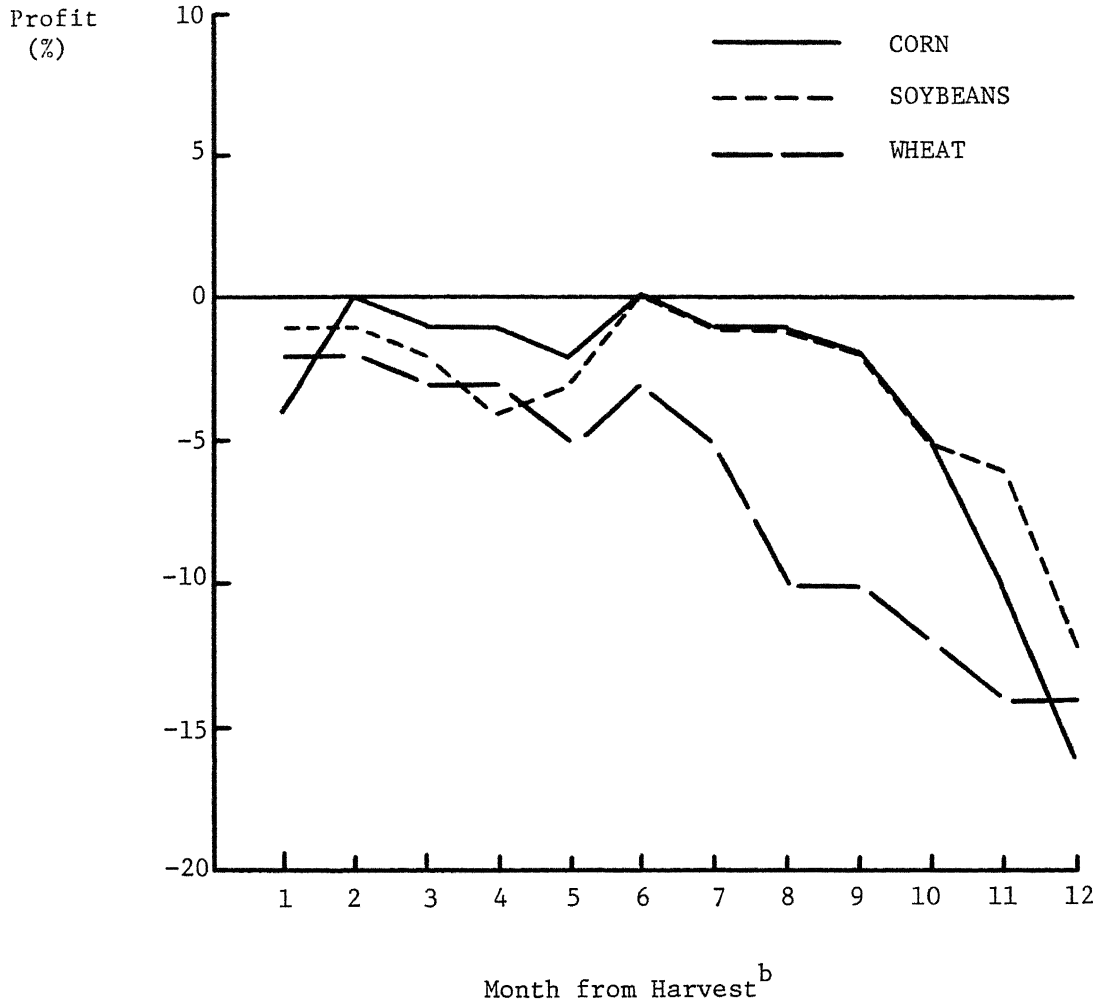
Month from Harvest[b]	Percent Profit or Loss		
	Corn	Soybeans	Wheat
1	-4	-1	-2
2	0	-1	-2
3	-1	-2	-3
4	-1	-4	-3
5	-2	-3	-5
6	0	0	-3
7	-1	-1	-5
8	-1	-1	-10
9	-2	-2	-10
10	-5	-5	-12
11	-10	-6	-14
12	-16	-12	-14

[a]Analysis for wheat involved only 1975-1982 crop years.

[b]Harvest was assumed to occur on October 15 for corn and soybeans and July 15 for wheat.

Source: Original data calculations.

Figure 1. Average Percent Profit or Loss from Storing Corn, Soybeans, and Wheat, Ohio, Crop Years 1974-1982.[a]



[a]Analysis for wheat involved only 1975-1982 crop years.

[b]Harvest was assumed to occur October 15 for corn and soybeans and July 15 for wheat.

Source: Original data calculations.

return of two percent for corn, seven percent for beans, and minus one percent for wheat. These substantially lower returns relative to those for the perfect knowledge case suggest that profits from storage are preponderantly a return to marketing skills.

The conclusion on the importance of marketing skills is further supported by the great diversity in the month it was most profitable to sell under the perfect knowledge assumption. Corn was sold four times at harvest, twice in August and once each in December, March, and July. Soybeans were sold twice each at harvest and September and once each November, April, May, June, and July. Wheat was sold four times at harvest and once each in September, November, April, and July (beginning of next harvest). This diversity suggests that most if not all rules of thumb and mechanical trading rules are unlikely to produce significant returns to storage over time. Only well-developed marketing skills can accomplish this task.

Conclusions

In conclusion, the relationship between price changes and storage costs are only one consideration in deciding to construct on-farm storage. Others include better labor efficiency from avoiding elevator lines, cheaper on-farm drying costs, avoidance of load-out charges if grain is moved from one elevator to another, and marketing flexibility. Nevertheless, the above results suggest that, on average, price increases do not exceed and may not equal storage costs. Instead, profits from storage result from highly developed marketing skills.

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